

WHAT IS CLAIMED IS:

1. A beverage bottling plant for filling bottles with a liquid beverage filling material, said beverage bottling plant comprising:

a filling machine being configured to fill empty bottles with liquid beverage filling material;

a conveyer arrangement being configured and disposed to move empty bottles to said filling machine;

said beverage filling machine comprising a plurality of beverage filling positions, each beverage filling position comprising a beverage filling device for filling bottles with liquid beverage filling material;

said filling devices comprising an apparatus being configured to introduce a predetermined volume of liquid beverage filling material into the interior of bottles to a substantially predetermined level of liquid beverage filling material;

said apparatus being configured to introduce a predetermined volume of liquid beverage filling material comprising an apparatus being configured to terminate the filling of beverage bottles upon liquid beverage filling material reaching said substantially predetermined level in bottles;

a closing station being configured and disposed to close filled

bottles;

a conveyer arrangement being configured and disposed to transfer filled bottles from said filling machine to said closing station;

a labeling station being configured and disposed to receive bottles to be labeled;

a conveyer arrangement being configured and disposed to convey bottles to said labeling station;

said labeling station comprising:

a frame structure, said frame structure having an axis disposed vertically;

a turntable structure being configured and disposed to rotate about said vertical axis of said frame structure, said turntable structure having a peripheral region;

a drive arrangement being configured and disposed to rotate said turntable structure about said vertical axis of said frame structure;

a plurality of support tables being configured to support and to rotate a bottle;

said support tables being disposed at said peripheral region of said turntable structure;

each support table having an axis disposed vertically about which vertical axis a support table can rotate;

each support table comprising a drive arrangement being configured and disposed to rotate its corresponding support table about its vertical support table axis, to permit rotation of a bottle supported on a support table;

a plurality of modules comprising:

a first module comprising:

at least one camera being configured and disposed to produce an image representative of the actual rotational position of a bottle supported on its corresponding support table adjacent said first module and to output signals representative of the image representative of the actual rotational position of a bottle;

a computer being configured and disposed to receive from said camera the output signals representative of the actual rotational position of a bottle, to compare the image representative of the actual rotational position with an image representative of a preset rotational position, and to output signals, to the drive arrangement of an adjacent

support table, to energize the drive arrangement and thus to rotate to a first position said adjacent support table and a supported bottle;
a second module comprising:

at least one camera being configured and disposed to produce an image representative of the actual rotational position of a bottle supported on its corresponding support table adjacent said second module and to output signals representative of the image representative of the actual rotational position of a bottle;

a computer being configured and disposed to receive from said camera of said second module the output signals representative of the actual rotational position of a bottle, to compare the image representative of the actual rotational position with an image representative of a preset rotational position, and to output signals, to the drive arrangement of said support table adjacent said second module, to energize the drive arrangement and thus to rotate to a second position said support table adjacent said second module and a supported bottle;

said second position being of greater precision than

said first position;

a third module being configured and disposed to affix a label to a bottle disposed in said second position on a support table adjacent said third module;

a fourth module being configured and disposed to print information on the label affixed to a bottle by said third, labeling, module; and

a fifth module being configured and disposed to inspect for the presence of a label on a bottle, and to determine the position of a label on a bottle;

each of said modules comprising a first coupling structure;

a plurality of second coupling structures, each being connected to said frame structure;

each first coupling structure being configured to be connectable to and to be disconnectable from its corresponding second coupling structure; and

each module being configured, upon connection to a second coupling structure, to be disposed adjacent moving bottles supported on said support tables.

2. The beverage bottling plant according to claim 1, wherein:

said first coupling structure and a second coupling structure together comprise a quick-connect and quick-disconnect structure;

each first coupling structure of each module is configured to be interchangeably connected to a plurality of second coupling structures;

said third, labeling, module, said fourth, printing, module, said fifth, inspecting, module each comprise a computer configured to process signals;

each one of said plurality of modules comprises a bus system configured and disposed to transfer signals from and to a corresponding module;

at least one of said modules comprises an arrangement to generate light;

at least one of: said first, alignment, module, said second, alignment, module, and said fifth, inspecting, module comprises at least one of: (i) and (ii), wherein (i) and (ii) comprise:

(i) a plurality of sensors configured and disposed to sense the presence a label affixed to a bottle; and

(ii) a plurality of sensors configured to sense the position of a label affixed to a bottle;

one of: (ii) and (iii), wherein (ii) and (iii) comprise:

(i) at least one of: said first, alignment, module, said second, alignment, module, and said fifth, inspecting, module is configured to sense a deviation of the actual position of a label affixed to a bottle by said third, labeling, module from a desired position of a label which label is to be added on a bottle; and

(ii) at least one of: said first, alignment, module, said second alignment, module, and said fifth, inspecting, module is configured to output signals to said third, labeling, module to minimize deviation of the actual position of a label affixed on a bottle by said third, labeling, module from the desired position of a label affixed on a bottle; and

said fifth, inspecting, module is configured to issue signals to said third, labeling, module to discontinue operation of said third, labeling, module.

3. The beverage bottling plant according to claim 2, comprising:

a conveyer arrangement configured and disposed to remove bottles comprising a defective label from said labeling station; and

said fifth, inspecting, module is configured to output signals to permit removal of bottles comprising a defective label with said removing conveyer arrangement from said labeling station;

at least one of: (i) and (ii), wherein (i) and (ii) comprise:

(i) at least one of: said first, alignment, module and said second, alignment, module comprises a plurality of sensors each being configured and disposed to sense the degree of rotation of a container disposed on a support table;

(ii) a central control is operatively connected to said labeling station; and

one of: (a) and (b), wherein (a) and (b) comprise:

(a) one of: said first, alignment, module and said second, alignment, module is configured to correct, under instructions from said central control, the degree of rotation of a support table and a bottle supported thereon; and

(b) one of: said first, alignment, module and said second, alignment, module is configured to correct, under absence of instructions from said central control, the degree of rotation of a support table and a bottle supported thereon;

said fourth, printing, module comprises an arrangement comprising one of: laser printing apparatus; laser marking apparatus; ink jet printing apparatus; tampon printing apparatus; and screen printing apparatus.

4. A container filling plant labeling station configured to label containers, such as, bottles and cans, said labeling station comprising:

a frame structure, said frame structure having an axis disposed vertically;

a turntable structure being configured and disposed to rotate about said vertical axis of said frame structure, said turntable structure having a peripheral region;

a drive arrangement being configured and disposed to rotate said turntable structure about said vertical axis of said frame structure;

a plurality of support tables, connected to said peripheral region of said turntable structure and each being configured and disposed to support a container and to rotate a supported container;

each support table comprising a drive arrangement being

configured and disposed to rotate its corresponding support table, to permit rotation of a container supported on a support table;

a plurality of modules at least comprising:

a first module comprising:

at least one sensor being configured and disposed to produce a representation of the actual position of a container supported on its corresponding support table adjacent said first module and to output signals representative of the representation of the actual position of a container;

a computer being configured and disposed to receive from said sensor the output signals representative of the representation of the actual position of a container, to compare the representation of the actual position with a representation of a preset position, and to output signals, to the drive arrangement of an adjacent support table, to energize the drive arrangement and thus to rotate to a preset position said adjacent support table and a supported container;

a second module being configured and disposed to affix a

label to a container disposed in said preset position on an adjacent support table;

a third module being configured and disposed to inspect for the presence of a label on a container, and to determine the position of an affixed label on a container;

each of said modules comprising a first coupling structure;

a plurality of second coupling structures, each being connected to said frame structure;

each first coupling structure being configured to be connectable to and to be disconnectable from its corresponding second coupling structure; and

each module being configured, upon connection to a second coupling structure, to be disposed adjacent moving containers supported on said support tables.

5. The container filling plant labeling station configured to label containers according to claim 4, wherein:

said first coupling structure and a second coupling structure together comprise a quick-connect and quick-disconnect structure;

each first coupling structure of each module is configured to be

interchangeably connected to a plurality of second coupling structures;

said second, labeling, module and said third, inspecting, module each comprise a computer configured to process signals;

each module comprise a bus system configured and disposed to transfer signals from and to a corresponding module;

at least one of said modules comprises an arrangement to generate light;

a fourth module configured and disposed to print information on a label affixed to a container;

at least one of: said first, alignment, module and said third, inspecting, module comprises at least one of: (i) and (ii), wherein (i) and (ii) comprise:

(i) a plurality of sensors configured and disposed to sense the presence a label affixed to a container; and

(ii) a plurality of sensors configured to sense the position of a label affixed to a container;

one of: (iii) and (iv), wherein (iii) and (iv) comprise:

(iii) at least one of: said first, alignment, module and said third, inspecting, module is configured to sense a deviation of the actual position of a label affixed to a container by said

second, labeling, module from a desired position of a label which label is to be added on a container; and

(iv) at least one of: said first, alignment, module and said third, inspecting, module is configured to output signals to said second, labeling, module to minimize deviation of the actual position of a label on a container by said second, labeling, module from the desired position; and

said third, inspecting, module is configured to issue signals to said second, labeling, module to discontinue operation of said second, labeling, module.

6. The container filling plant labeling station configured to label containers according to claim 5, comprising:

a conveyer arrangement configured and disposed to remove containers comprising a defective label from said labeling station;

said third, inspecting, module is configured to output signals to permit removal of containers comprising a defective label with said removing conveyer arrangement from said labeling station;

at least one of: (i) and (ii), wherein (i) and (ii) comprise:

(i) at least said first, alignment, module comprises a

plurality of sensors each being configured and disposed to sense the degree of rotation of a container disposed on a support table;

(ii) a central control is operatively connected to said labeling station; and

one of: (a) and (b), wherein (a) and (b) comprise:

(a) said first, alignment, module is configured to correct, under instructions from said central control, the degree of rotation of a support table and a container supported thereon; and

(ii) said first, alignment, module is configured to correct, under absence of instructions from said central control, the degree of rotation of a support table and a container supported thereon; and

said fourth, printing, module comprises an arrangement comprising one of: laser printing apparatus; laser marking apparatus; ink jet printing apparatus; tampon printing apparatus; and screen printing apparatus.

7. A container filling plant container information adding

station, such as, a labeling station, configured to add information to containers, such as, bottles and cans, said information adding station comprising:

- a plurality of supports, each being configured and disposed to support a container thereon;

- each support comprising an arrangement being configured and disposed to adjust its corresponding support, to permit adjustment of the position of a container supported on said corresponding support;

- a first module comprising a first sensor being configured and disposed to output signals representative of the actual position of a container disposed on a predetermined support, which predetermined support is disposed in a predetermined position with respect to said first module;

- an arrangement being configured and disposed:

- to receive output signals representative of the actual position of a container disposed in a predetermined position with respect to said first module from said first sensor,

- to compare the representation of the actual position with a stored representation of a desired position of a container,

- to output signals to the adjusting arrangement of said

predetermined support to move said predetermined support and the container supported thereon to the desired position;

at least one second module being configured to add information to a container disposed in the desired position on said predetermined support;

each module comprising a first coupling structure;

said container information adding station comprising at least one second coupling structure;

each said at least one second coupling structure being configured and disposed to receive output signals related to said first sensor to adjust said predetermined support and the container supported thereon;

each first coupling structure being configured to be connectable to and to be disconnectable from its corresponding second coupling structure;

each module being configured, upon connection to a second coupling structure, to be disposed in a predetermined location with respect to moving containers supported on said supports.

8. The container filling plant container information adding

station according to claim 7, comprising:

a third module being configured and disposed to inspect the information added on a container by said second, information adding, module.

9. The container filling plant container information adding station according to claim 8, wherein:

said first coupling structure and a second coupling structure together comprise a quick-connect and quick-disconnect structure.

10. The container filling plant container information adding station according to claim 9, wherein:

each first coupling structure of each module is configured to be interchangeably connected to a plurality of second coupling structures.

11. The container filling plant container information adding station according to claim 10, wherein:

each module comprises a computer configured to process signals; and

each module comprises a bus system configured and disposed to

transfer signals from and to a corresponding module.

12. The container filling plant container information adding station according to claim 11, wherein:

at least one of said modules comprises an arrangement to generate light.

13. The container filling plant container information adding station according to claim 12, comprising:

a fourth module; and

at least one of: said second, information adding, module and said fourth module is configured and disposed to dispose information on a container.

14. The container filling plant container information adding station according to claim 13, wherein:

one of: said first, alignment, module and said third, inspecting, module comprises at least one of: (a), (b), and (c), wherein (a), (b), and (c) comprise:

(a) at least one camera configured and disposed to

produce an image of a container being viewed by said at least one camera;

(b) a plurality of sensors configured and disposed to sense the presence of information added on a container; and

(c) a plurality of sensors configured to sense the position of information added on a container.

15. The container filling plant container information adding station according to claim 14, wherein:

one of: (a) and (b), wherein (a) and (b) comprise:

(a) at least one of: said first, alignment, module and said third, inspecting, module is configured to sense a deviation of the actual position of information added on a container by said second, information adding, module from a desired position of information which information is to be added on a container; and

(b) at least one of: said first, alignment, module and said third, inspecting, module is configured to output signals to said second, information adding, module to minimize deviation of the actual position of information added on a container by said second, information adding, module from the desired position.

16. The container filling plant container information adding station according to claim 15, wherein:

said third, inspecting, module is configured to issue signals to said second, information adding, module to discontinue operation of said second, information adding, module.

17. The container filling plant container information adding station according to claim 16, wherein:

at least one of said at least one second, information adding, module comprises a labeling module configured and disposed to affix a label to a container.

18. The container filling plant container information adding station according to claim 17, comprising:

a conveyer arrangement configured and disposed to remove containers comprising a defective label from said container information adding station; and

said third, inspecting, module is configured to output signals to permit removal of containers comprising a defective label with said removing conveyer arrangement from said container information adding

station.

19. The container filling plant container information adding station according to claim 18, wherein:

one of: (a) and (b), wherein (a) and (b) comprise:

(a) at least said first, alignment, module comprises a plurality of sensors each being configured and disposed to sense the degree of rotation of a container disposed on a support; and

(b) a central control is operatively connected to said container information adding station; and

one of: (i) and (ii), wherein (i) and (ii) comprise:

(i) said first, alignment, module is configured to correct, under instructions from said central control, the degree of rotation of a support and a container supported thereon; and

(ii) said first, alignment, module is configured to correct, under absence of instructions from said central control, the degree of rotation of a support and a container supported thereon.

20. The container filling plant container information adding station according to claim 19, wherein said fourth, printing, module comprises an arrangement comprising one of: laser printing apparatus; laser marking apparatus; ink jet printing apparatus; tampon printing apparatus; and screen printing apparatus.